Attachment

U.S. Department of Transportation
Federal Aviation Administration

Memorandum

Subject: ACTION: Review and Concurrence, Equivalent Level of Safety Finding for the Hawkins and Powers Fire Retardant Tank Installation on Basler Converted DC-3 (TP67) FAA Project Number ST2484DE-T

Date: October 6, 2003

From: Manager, Airframe and Cabin Safety Branch, ANM-115

Reply to Attn. of: R. Caldwell (303) 342-1086

To: Manager, Denver ACO, ANM-100D

ELOS Memo #: ST2484DE-T-A-2

Background
Hawkins and Powers has requested approval of a fire retardant tank installation for the Basler converted DC-3 (TP-67) that will enable the airplane to function in a fire fighting role. Because the fire retardant tank is removable, the airplane is expected to be operated alternately in a restricted category fire fighting role and in standard category carrying passengers and/or cargo. In the firefighting role, the airplane will be subjected to a loads environment that is more severe than the one for which the airplane was originally designed. In addition, the FAA has required that the certification basis of this modification include Title 14 Code of Federal Regulations (CFR) part 25.571 at Amendment 25-45.

The Basler Converted DC-3 (TP67) is not currently certified to updated damage tolerance regulations. Several recent accidents involving fire bombers have highlighted the importance of an airworthiness inspection program based on damage tolerance principles. In accordance with § 21.101(b), the FAA is requiring that the Hawkins and Powers fire retardant tank installation on this airplane be demonstrated compliant to updated damage tolerance regulations.

Applicable regulation(s)
§§ 25.571, 21.101(b)

Regulation(s) requiring an ELOS
§ 25.571

Description of compensating design features or alternative standards which allow the granting of the ELOS (including design changes, limitations or equipment need for equivalency)

Although there is currently research occurring in this area, the operational loads environment for firefighting missions is not fully understood at this time. In addition, the original inspection philosophy of the DC-3 was based on in-service experience as opposed to the analytical approach that would be necessary for strict compliance with § 25.571 at Amendment 25-45. Therefore, strict compliance with § 25.571 cannot be practically demonstrated.

The Hawkins and Powers approach for demonstrating compliance to § 25.571 is summarized as follows:

1) Generate a conservative fatigue loads spectrum for the firebombing role, as well as a loads spectrum for the cargo/transport role.
2) Perform a damage tolerance analysis on the most critical principal structural elements (PSE) of the wing and center fuselage in both the cargo/transport and firebombing roles.
3) Determine the ratio of inspection intervals derived from these two analyses, referred to as the firebombing severity factor.
4) Apply this ratio to the inspection intervals for all other PSEs using the existing service-based inspection program as a baseline.

Explanation of how design features or alternative standards provide an equivalent level of safety to the level of safety intended by the regulation

While the firebombing severity factor, described above, is determined by using damage tolerance analysis, this factor is applied to an inspection program which was developed using service information. The FAA does not believe that this methodology demonstrates direct compliance to § 25.571 at Amendment 25-45, but that it does provide an equivalent level of safety.

FAA Advisory Circular (AC) 91-56A outlines the principles of a damage-tolerant design and provides guidelines on developing a continuing structural integrity program for airplanes certified prior to the adoption of § 25.571 at Amendment 25-45. While this advisory material is intended for use by manufacturers and operators of large transport airplanes with gross weights above 75,000 pounds, the principles that it addresses are applicable to this STC.

The damage tolerance methodology utilized by Hawkins and Powers meets the damage tolerance principles as outlined in AC 91-56A to the greatest extent practicable and thus provides an equivalent level of safety to the requirements of § 25.571 at Amendment 25-45.

Section 10 and Appendix 2 of AC 91-56A outline the requirements for evaluation of widespread fatigue damage (WFD). WFD, as described in this AC, was not specified in § 25.571 until Amendment 25-96. Therefore, Section 10 and Appendix 2 of the AC need not be considered for this application.

FAA approval and documentation of the ELOS

The FAA accepts the Damage Tolerance Methodology presented in Report No. CAC/TR/03-006, Revision C, dated June, 2003 (Proposed Certification Methodology To Provide an Equivalent Level of Safety to FAR 25.571 for The BT-67 Firebombing Configuration) with respect to ELOS for FAR 25.571.

Original signed by Alan Sinclair for Frank Tiangsing	*10/24/03*
Manager, Airframe and Cabin Safety Branch, ANM-115	Date

ELOS Originated by Denver ACO:	Project Engineer: Roger Caldwell	Routing Symbol: ANM-100D